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Toxicity and Efficacy of Different Target Volume Delineations of Radiotherapy Based on the Updated RTOG/NRG and EORTC Guidelines in Patients with Grade 3–4 Glioma: A Randomized Controlled Clinical Trial

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Abstract

Purpose: Our study aimed to evaluate the safety and efficacy of radiotherapy (RT) in the treatment of grade 3-4 glioma by comparing the updated Radiation Therapy Oncology Group (RTOG)/NRG with European Organization for Research and Treatment of Cancer (EORTC) guidelines for target volume delineation.

Methods: A total of 245 patients with newly diagnosed World Health Organization grade 3-4 glioma were enrolled and randomly assigned (1:1 ratio) to undergo postoperative RT with concurrent and maintenance temozolomide. The radiation target volume delineation was determined by using either the updated RTOG/NRG (n = 122) or EORTC guidelines (n = 123). The primary endpoint was the toxicity associated with treatment. Progression-free survival (PFS) and overall survival (OS) were considered secondary endpoints.

Results: No differences in low- or high-grade toxicities between the two groups, and neither group exhibited grade 5 toxicities. No significant differences in neurological toxicities were observed between the RTOG/NRG and EORTC groups. The median PFS in the RTOG/NRG group and the EORTC group was 11.0 months (95% confidence interval [CI], 7.1-14.9 months) and 10.0 months (95% CI, 3.8-16.2 months), respectively (P = 0.73). The median OS in the RTOG/NRG group and the EORTC group was 19.5 months (95% CI, 14.2-24.8 months) and 18.5 months (95% CI, 12.8-24.2 months), respectively (P= 0.80). In patients with IDH wild type glioblastoma, there were no significant differences between the RTOG/NRG group and the EORTC group in median PFS (8.0 months (95% CI, 6.8-9.2 months) vs. 8.0 months (95% CI, 7.0-9.0 months), P = 0.38) and median OS (12.0 months (95% CI, 7.2-16.8 months) vs. 11.0 months (95% CI, 9.7-12.3 months), P = 0.10).

Conclusions: Compared with EORTC principles, postoperative RT according to RTOG/NRG principles did not increase treatment-related toxicities and was equally effective for patients with grade 3-4 glioma, including the subgroup of patients with IDH wild type glioblastoma.

Keywords: efficacy; grade 3-4 glioma; radiotherapy; target volume delineations; toxicity.

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